

DT12 Rec'd PCT/PTO 21 JAN 2005

20

CLAIMS

1. A substrate transfer apparatus for a component mounting machine, for transferring a substrate into a mounting process (8) in which components are mounted onto the substrate and transferring the substrate from said mounting process (8), comprising:

5 a mounting-waiting process (7) for making the substrate to be transferred into the mounting process (8) wait before the mounting process (8); and

10 a substrate discharge-waiting process (9) for making the substrate after being transferred from the mounting process (8) wait before a following process, wherein:

15 transfer of an unmounted substrate (3) from said mounting-waiting process (7) to the mounting process (8) and transfer of a mounted substrate (2) for which mounting has been done in the mounting process (8) from the mounting process (8) to the substrate discharge-waiting process (9) 20 are performed simultaneously,

characterized in that detecting means (6) are provided for detecting that a plurality of substrates have been transferred into the substrate discharge-waiting process (9) as part of the same transfer.

25 2. The substrate transfer apparatus for a components mounting machine according to claim 1, wherein the detecting means includes: a substrate-arrival detecting sensor (5c) for detecting the mounted substrate (2) transferred into the substrate discharge-waiting process (9); and a substrate-continuity detecting sensor (6), provided upstream of the substrate-arrival detecting sensor (5c), for detecting an unmounted substrate (3) being transferred at the same time as a mounted substrate (2).

35 3. The substrate transfer apparatus for a component mounting machine according to claim 2, wherein the

substrate-continuity detecting sensor (6) is arranged at a position that satisfies $X < XS < 2X$, where a distance from the substrate-arrival detecting sensor (5c) to the substrate-continuity detecting sensor (6) is XS and a substrate dimension in the substrate transfer direction is X .

4. The substrate transfer apparatus for a component mounting machine according to claim 3, wherein the substrate-continuity detecting sensor (6) is arranged to be movable to the position that satisfies $X < XS < 2X$.

5. The substrate transfer apparatus for a component mounting machine according to claim 3, wherein the substrate-continuity detecting sensor (6) is constructed to be automatically movable to the position that satisfies $X < XS < 2X$, in accordance with the substrate dimension x in the substrate transfer direction.

6. The substrate transfer apparatus for a component mounting machine according to claim 1, wherein the detecting means includes: a substrate-arrival detecting sensor (5c) for detecting the mounted substrate (2) transferred into the substrate discharge-waiting process (9); and a plurality of substrate-continuity detecting sensors (6a, 6b, 6c), provided upstream of the substrate-arrival detecting sensor (5c) at different positions in a substrate transfer direction from one another, for detecting an unmounted substrate (3) being transferred at the same time as the mounted substrate (2).

7. The substrate transfer apparatus for a component mounting machine according to claim 6, wherein the substrate-continuity detecting sensors (6a, 6b, 6c) detect an unmounted substrate (3) by a substrate-detection state of one (6b) of the plurality of substrate-continuity detecting sensors (6a, 6b, 6c) that is located at a

position satisfying $X < XS < 2X$, where a distance from the substrate-arrival detecting sensor (5c) to the one substrate-continuity detecting sensor (6b) is XS and a substrate dimension in the substrate transfer direction is
5 X .

8. The substrate transfer apparatus for a component mounting machine according to any one of claims 6 and 7, wherein the substrate transfer apparatus includes a minimum required number of the substrate-continuity detecting sensors (6a, 6b, 6c) by arranging N sensors that satisfy $2^n \times P_{\min} > P_{\max}$ at positions determined by $2^n \times P_{\min} 2$ (n = 1, 2, ..., N) from a minimum substrate size (P_{\min}) and a maximum substrate size (P_{\max}) in the substrate transfer direction, respectively, for which the electronic component mounting machine (1) is intended.
10
15